SETTING SYSTEM LIMITERS

SLS AUDIO W. JACKSON OZARK, MO 65721 417 883 4549

APPLICATION NOTE

(REV 905)

Properly setting up system limiters to protect your drivers while providing for maximum performance can be a tricky business. This is due to the many techniques of DSP limiting that are available to DSP designers. There is no perfect way to establish a single method of limiter setup that protects from all forms of signal input stimulus that the driver may encounter without knowing very specific data about the limiter block characteristics for the DSP in use. As an example, how a DSP limiter threshold reacts between normal music and feedback can be quite substantial depending on the DSP software and hardware.

Please remember that in severe situations, drivers can still be damaged so good system design (see Application Note "Which SLS Line Array to Choose") and common sense is the rule. Below is a method of setting a limiter threshold that will do a good job of protecting the driver with normal program material, however the driver may still be vulnerable to sustained high frequency feedback or very large low frequency transients.

1. Obtain a source to generate pink noise and obtain a true RMS voltage meter.
2. Set up the system's gain structure to match the application.
3. **Disconnect the speakers from the amplifier under test.** Damage to the drivers will result if this in not done.
4. Make sure that the limiter is bypassed on your processor unit being used for protection. Leave the crossover, HPF and any EQ filters used engaged (if applicable).
5. Put the voltage meter across the amplifier terminals and turn up the pink noise volume until the meter reads 2 volts above the RMS voltage rating specified for that driver.
6. Set your limiter to a minimum of a 100:1 ratio and input the suggested attack and release times. Engage the limiter and slowly decrease the threshold until the voltage is lowered to the rating specified (without changing the gain of the pink noise).
7. Repeat the above procedure for each driver and/or box type being used.
8. Turn off the pink noise and re-connect the speakers.
9. Engage the predictive peak stop limiter if the DSP has one available at 6dB above the RMS setting (we have provided the calculated voltage as well). Be aware of amplifier clipping. If this occurs during system use, lower the peak stop threshold until the amplifier is just into clipping. As an alternative, engage the self-contained limiter circuit in the amplifier if it has one.

   This only needs to be done once as long as the amplifier/limiter combination does not change. However, any change of the amplifier gain will modify the limiter's action. If the amplifier gain is decreased, protection will engage early, limiting driver output. If the amplifier gain is increased, protection will engage only after the driver is above the safe RMS voltage.

   For this reason, it is recommended that this limiter setup procedure be performed with the amplifier gain at maximum when the system will be used in an unsupervised situation or when the amplifier gain can be user modified.

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DRIVER PROTECTION FOR CURRENT PRODUCTS

SLS Woofers and/or Passive Protection Chart		
4” Woofers	2403, 2413 CM141CC CM141CC x4 (CM208W series/parallel output)	18V, 8msec attack, 128msec release, peak stop 36V 20V, 8msec attack, 128msec release, peak stop 40V 40V, 8msec attack, 128msec release, peak stop 80V
5.25” Woofers	LS6593v2 (passive or LF)	60V, 8msec attack, 128msec release, peak stop 120V
6.5” Woofers	CS200 LS6500, CS6500 (LF) LS7500 (LF) LS8695v2 (LF) LS9000 (MF) LS9900 (MF)	28V, 2msec attack, 32msec release, peak stop 56V 28V, 4msec attack, 64msec release, peak stop 56V 45V, 16msec attack, 256msec release, peak stop 90V 56V, 8msec attack, 128msec release, peak stop 112V 64V, 2msec attack, 32msec release, peak stop 128V 89V, 2msec attack, 32msec release, peak stop 178V
8” Woofers	PRD8COM T28R, T28R-I S8R, CT8R 8290v2, 8290Tv2-I CM208W, CM208W-TB, CM208W-SR 8190v2, 8190Tv2-I, CS890Sv3 LS9000 (LF), LS8800 (LF), 2806H (LF), CS-MH2806 (LF)	28V, 8msec attack, 128msec release, peak stop 56V 28V, 16msec attack, 256msec release, peak stop 56V 31V, 16msec attack, 256msec release, peak stop 62V 42V, 16msec attack, 256msec release, peak stop 84V 40V, 45msec attack, 720msec release, peak stop 80V 42V, 8msec attack, 128msec release, peak stop 84V 64V, 16msec attack, 256msec release, peak stop 128V
12” Woofers	1290, 1290T-I, CS300E 112RT, 112RT-I, 112RM 212EL	45V, 16msec attack, 256msec release, peak stop 90V 64V, 16msec attack, 256msec release, peak stop 128V 64V, 45msec attack, 720msec release, peak stop 128V
15” Woofers	1590, 1590T-I, CSB115, CSB215 115RT, 115RT-I, 115RM LS9900 (LF), LSB8115, 115EL, 215EL	49V, 16msec attack, 256msec release, peak stop 98V 64V, 16msec attack, 256msec release, peak stop 128V 64V, 45msec attack, 720msec release, peak stop 128V
18” Woofers	118EL, CS118, 218EL, CS218EL, SP1000, SP810 118XEL, CS118XEL, SP2000, SP820	64V, 45msec attack, 720msec release, peak stop 128V 64V, 45msec attack, 720msec release, peak stop 128V
SLS Ribbon Protection Chart		
PRD1000 Ribbons	LS9900 (HF) All bi-amp models with (1) PRD1000 ribbon w/o TPAC All bi-amp models with (1) PRD1000 ribbon with TPAC	40V, .5msec attack, 8msec release, no peak stop 20V, .5msec attack, 8msec release, no peak stop No RMS limiting, peak stop 50V
PRD500 Ribbons	LS8695v2 (HF) All bi-amp models with (1) PRD500 ribbon w/o TPAC ll bi-amp models with (1) PRD1000 ribbon with TPAC	47V, .5msec attack, 8msec release, no peak stop 15.6V, .5msec attack, 8msec release, no peak stop No RMS limiting, peak stop 32V
PRD250 Ribbons	LS6593v2 (HF)	70V, .5msec attack, 8msec release,